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A DISCOURSE

ON THE

WESTERN AUTUMNAL DISEASE.

READ BEFORE

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Gentlemen—

I am about to offer you an exposition of the nature and causes of the *Western Autumnal Disease.*

It is somewhat remarkable, and at the same time a reproach to the profession in this country, that after so many years of observation and experience, there is nothing yet on record relating to these periodical scourges,—a subject which is amply sufficient for a large volume of concise and highly interesting description. In selecting, therefore, for a single thesis so extensive a theme, I can expect little more than to exhibit an outline, calculated for those only who are clinically conversant with the minutiæ of the disease.

In connexion with this subject, I shall likewise present to you the *pathology* of the more remarkable forms which our epidemics assume, involving a new attempt to ascertain the *proximate cause* of Fever and Inflammation. To condense the whole matter into the usual limits of a public discourse, has been with me, a primary object. If, however, I shall trespass on your time and patience, I have only to plead a mistaken opinion of the interest and importance attached to the inquiry.

The complicated motions which characterize living beings, and which, in their aggregate, constitute all we can know of *animation*, are in man, the result of the intricate mechanism of numerous and widely different organs. The functions, it is obvious, must be as multifarious as the parts which perform them, though all tend, with wonderful combination, to the ease and preservation of the individual. But we know, full well, how frequently these grand objects may be impelled or destroyed by the subjection in which

we are placed, to innumerable injurious agents; so that ease and harmony of the functions to which we give the name of *health*, is but one among an incalculable variety of conditions in which we may be placed. To all other *modes of existence*, we apply the general term of *disease*, subdivided by *nosologists* into catalogues of specific disorders; but which have, in no instance, even approximated to perfection. With so great a number of particular organs, each of which is known to be susceptible of a great variety of derangement, constituting the alphabetical elements from which a complete dictionary of disease must, if possible, be formed, we may almost despair of the success of future classifications, and at once, endeavor to discover a course of pathological inquiry, which will enable us to dispense with this hopeless department of our science.

These observations will account for the unusual method in which I shall now proceed to investigate the nature and causes of the Western Autumnal Disease. The brief limits of a public discourse will not permit as expanded a view of this all important subject, as a complete history would require. I shall, therefore, confine my remarks, exclusively, to the observations I have made, and the conclusions to which I have been led, from an attentive examination of an unusual number of cases during the last six years.

The name by which this disease is generally known, (*the bilious fever*) must convey to those who are unacquainted with its phenomena, a very erroneous impression. It is true, that many cases exhibit the symptoms, which in other parts of the world characterize that affection; but, admitting for these the propriety of the appellation, it can be said to be only *one form* in which the disease appears; and in many other cases of the same epidemic, not a single symptom will be exhibited of morbid identity. Yet, no rational mind can, for a moment, doubt that such identity actually exists—that there is a close relation of condition and cause among that immense variety of disorder, from a mild tertian intermittent, through remittent, congestive and inflammatory, to the most malignant attacks; and that such relation does not depend on *fever*, or on any circumstance which, with propriety, can be denominated *bilious*.

First, this relation does not depend on fever, because many cases occur, in which no symptoms deserving that name, appear during their progress. It may be deemed a bold assertion, but I

have no hesitation to advance it, that much injury has resulted from the common application of that term. Those disorders to which it is generally applied, are in many cases so opposite in their appearances, as to have rendered it impossible, for even the most distinguished of our authors, to define the word; each writer attempting a definition, producing in the whole, a discordant variety, which it is amusing, if not edifying, to compare. Debility and spasm, convulsion of the blood vessels, cerebral inflammation, irritation, have, each in its turn, been offered as conclusive, by the genius of Cullen, Rush, Clutterbuck and Hosack; and though in every instance they have been supported by masterly ingenuity, yet it is too obvious to the clinical observer, that they are equally partial in their application. The truth is, that fever is a mere symptom, or rather, a collection of symptoms, which is manifested in a great variety of disorder, and essential to the existence of many forms of disease. The great Boerhaave, with the enlightened assistance of his commentator Van Sweiten, laboriously endeavored to settle the definition of fever; but after years of careful observation, and a collection of innumerable cases, in the record of which they noted all the attendant symptoms, among which, *increased heat* and *frequency of pulse*, seemed for a time to promise a successful termination to their research, they were ultimately compelled to acknowledge, that there is no one appearance, which is invariably present; in other words, that fever has no pathognomonic symptom. Absurd and ridiculous as their conclusion seems, it is only so when you regard fever as a disease. View it as a symptom, that is, as an occasional attendant on many affections, and, in such cases, used as a term of facility to mark the presence of frequency of pulse and increased animal heat, it no longer needs defining, and must cease to confuse and mislead. In this sense I shall here employ it, and have thought proper to discard the term, in naming the disease we are about to consider.

The appellation *bilious*, seems to be still more objectionable than that of fever, and as usually employed, is as difficult to define: at least, different authors evidently design a peculiar meaning. If by that term, is to be understood an increased secretion and effusion of bile, or the reverse, or an engorgement, or a partial inflammation of the liver, I cannot but deny, that either is present in even a majority of cases. But a flow of bile, a suspension of that secre-

tion, and a great variety of derangement in the liver, are occasionally manifested among the symptoms; but deserve no pre-eminent distinction above a thousand others that as frequently occur. I have, therefore, discarded this term, as it is an obvious proposition that no morbid condition can be defined, but by circumstances invariably attending it. As well might you define a phrenitis to be a delirium, as our fall epidemic to be a fever, or to say that it is bilious.

Upon what circumstances then, does this identity depend? To answer this question satifactorily, it will be necessary to inquire minutely into the nature, the proximate cause, and history of the disease. With this view, it will be most convenient to consider, in the first place, the common tertian ague—the simplest of its forms; and then by comparative pathology, trace the changes and modifications that are annually presented to us. During such discussion, I trust, sufficient evidence will be adduced to establish the point before us.

It is too well known to admit of discussion, that in a regular intermittent ague, there are three distinct stages or forms of morbid action. These stages are generally denominated the cold, the hot, and the sweating stage. Dr. Armstrong, the able author of the work on Typhus, with obvious propriety, objects to this language, and has happily substituted terms much more explicit.—The first, he denominates the stage of *congestion*, the second of *excitement*, the third of *collapse*. To these there is, however, one objection as regards the first, in as much as congestion is by no means confined to that stage of the disorder—though generally so in *mild* intermittents—but is often continued through the course of the disease, and for months and years after apparent recovery, as is manifested in those frequent and troublesome enlargements of the liver and spleen, which follow long protracted agues. I shall, therefore, term the first stage *preparatory*, using Dr. Armstrong's other names as correctly descriptive, and proceed to investigate each condition by itself.

Previous to this particular inquiry, I beg leave to make some remarks on the nature of the human circulation, as it is almost wholly on the heart and blood-vessels, that the disease radically depends; and is diffused, so to speak, through the whole circle of organs.

The circulatory system may naturally be divided into the HEART, LARGE ARTERIES, CAPILLARIES and VEINS. The heart is the fountain of the vital fluid: the large arteries are merely intended to convey the blood to the different organs; which, in all cases, are entirely composed of capillaries, with their necessary attendants: and the veins return the blood to the source from whence it came. The heart possesses immense muscular power, and in all probability, solely causes the whole routine of circulation; for it is useless to inquire, whether the large vessels contribute to the motion of the blood, since the most delicate and careful tests have been frequently employed, without establishing the fact; and all those unimportant and trifling phenomena, which are supposed to favor their propelling power, can be satifactorily explained on other and more consistent principles, and if really proved to exist, or not, can have no bearing on the subject before us; as it is not presumed, that such power is ever in opposition to that of the heart, but that it must always be in unison with it. To avoid complexity of language, I shall therefore use the phrases, "*power of the heart*," and "*power*" or "*force of circulation*," as precisely synonimous.

To this power, there resides in the capillary system, an adequate resistance; for if no such resistance be admitted, life would necessarily gush from a thousand pores. The veins, from their structure, are incapable of affording it, and the large arteries offer too free a course for the blood, to be considered a material obstacle to the circulation. In health, we must necessarily admit that this power and resistance are naturally and precisely balanced; but in disease, though a balance during the existence of life must be preserved, the resistance is unequal in different parts of the body, or too great general distention, or general contraction always takes place.

It is not, however, to the capillaries alone, that a sufficient resistance is to be attributed. The substances in which they are every where imbedded, aid the natural contractility or elasticity of the vessels, and together constitute the *internal* sources of vascular resistance. In addition to these, we are surrounded by a medium possessing considerable weight, pressing equally in all directions; and we cannot for a moment doubt, that from fourteen to sixteen pounds on every square inch of surface, is of essential importance, as an external support to the capillaries, against the

power of the heart. If any doubt can possibly exist, the uniform phenomena which are manifested in those who have ascended in balloons or on mountains to considerable elevations, which have been so frequently published as to obviate the necessity of detailing them here, must remove all cepticism. here are some species of fish which, when taken from their natural element, bleed at the pores, or become inflamed; that is, the superficial vessels become distended. The effect of the familiar operation of cupping, and many other facts might be adduced to strengthen the position; but I trust enough has been brought forward for complete conviction.

That the capillary vessels possess CONTRACTILITY, is also unquestionable. The changes of complexion, so frequent in every individual, the visual phenomena of external inflammations, and the effects of astringent or contracting agents applied to the surface, must establish the fact. If any other example can be required, I would refer you to the suppression of hemorrhage, when an artery is ruptured, compared to a more partial division. It is to this power of contracting their dimensions, that in old age, the minute vessels gain the ascendency over the enfeebled heart; and all remote and delicately constructed parts diminish, and are ultimately destroyed: whilst in the infant, whose heart has been forming with sufficient power to overcome the pressure of the maternal uterus, assisted by that of a dense medium, exhibits after birth, when the external supporters of vascular resistance are much diminished, a predominance of capillary circulation, evidenced in the energy of the organic functions, extreme florid complexion and acuteness of external sense. In them, however, the development of the body extending the mass through which the heart must circulate the blood; the power and resistance become, at length balanced in the most advantageous manner, constituting the period of maturity.

CONTRACTILITY is one of the peculiar properties of FIBRE—a substance that enters largely into the composition of living bodies; and to which they owe all their characteristic phenomena. The theory of animation should have reference only to the *properties* of this substance, and the *circumstances* in which they are developed. The whole mystery of life consists in this; and the long and arduous search after its hidden cause, which, ever since the origin of our science, has trammelled and almost suppressed its pro-

gress, should now be classed with its contemporary folly of inquiring into the real nature of the common properties of matter.—We can learn nothing more of magnetism, or of gravity, or of any other peculiar or general endowment of matter, than of the general or peculiar properties of muscular fibre. That a body composed of the latter substance, arranged by infinite wisdom, should manifest a singular succession of characteristic events, ought to excite no greater astonishment than the more familiar occurrences of external nature, nor drive us to the unreasonable belief of any existence, mysterious and subtil, as the necessary basis of the phenomena of life. Discarding, therefore, the ancient "*vis vitæ*," I must equally object to the "*vis medicatrix*;" and consequently refer all living motions, whether morbid or healthy, to the innumerable changes of circumstances, in which a part of the whole system may be placed.

Among the properties of fibre, there is one that has particular reference to the subject before us. Wherever muscularity exists there is required *a certain mode and degree of motion*, which, we are compelled to believe, cannot be destructive; but when, as frequently occurs, from the influence of mutable circumstances, a collection of fibres are brought into excessive action, a consequent feebleness must follow—relaxation always succeeding to contraction in a direct ratio, until the power of resuscitation—a result of organized structure, restores their fibres to their natural tone.—The doctrine of INDIRECT DEBILITY must be admitted by every reflecting mind. It is indeed an *axiom* from which we may reason with entire safety, and applies as perfectly to the involuntary as to those motions under the influence of the will. Thus the stomach, when excited to violent and unusual contraction manifests, through many unequivocal symptoms, a corresponding succession of relaxation and debility. The skin, when stimulated by powerful agents, at length becomes tumid and red. So it is with the heart: from long continued and violent action, the circulation becomes enfeebled, and the nearer branches of the aorta, must, to a great degree, monopolize the blood: the surface and the extremities then shrink and become cold. This general law, must apply, with equal force, to the minutest subdivision of the vessels: indeed many cases occur, in which the whole process may be readily detected by the eye, in applying contracting agents to mild and circumscribed

inflammations; and more powerful irritants to parts not distended with blood; or, in other words, NOT INFLAMED.

INFLAMMATION then, *consists in a preternatural distention of the minute vessels of a part*, produced either by diminishing the internal or the external supporters of vascular resistance. A diminution of resisting force may be brought about—1st, by over-contraction—2dly, by destroying the contractility of the minute vessels; as in heating, bruises, rubbing, or in burns—or, 3dly, by counteracting external supporters. In either case, the part so affected, must endure a larger share of the propelling power of the heart, than in its healthy condition; and local distention must necessarily follow. This constitutes the proximate cause of ALL inflammations, and is manifested to our senses by increased redness, heat, and tumor of the part.—*Pain* is a very common, though not an invariable attendant; but when present, indicates a degree of distention of the vessels, capable of compressing the minute nerves, which every where accompany the capillaries. There is one circumstance, however, which very generally attends inflammation, which deserves particular inquiry, and on which I shall somewhat enlarge, viz: *dryness of surface*, or suspension of the usual functions of the part affected.

Particular secretion has always been considered one of the numerous arcana of living nature, which still continues to baffle every attempt at elucidation. To tell by what precise steps the blood becomes in one part changed to the *bile*, in another to the *saliva*, &c. though necessarily depending on chemical and mechanical laws, is perhaps more than we can at this time promise for the glory of any future philosopher. But, however, such knowledge might extend our acquaintance with the more rare phenomena that attend every disorder, I do not apprehend that it would throw much additional light on the great outlines of disease. The *general mechanism* belonging to secreting and exhaling organs, is sufficient for all essential purposes; and this, from what is already known, can readily be explained.

It is admitted by all physiologists, that arterial deposites, whether in the form of secretion or of effusion, can be the result but of one only, of the different structures about the capillaries.—You are aware, that on the subject of minute construction, we must admit of conjectural reasoning as our means of research; and the condition of our senses is much too gross, to hope any thing from ana-

tomical investigation.—The one is offered to account for the phenomena, by supposing the existence of numerous *pores* in the sides of the minute vessels: the other, by supposing an additional set of tubes, to come in considerable numbers from the arterial filaments. Each of these hypotheses has its warm and decided advocates; and although conjectural, if either shall be found to account for all known appearances, without a single instance of inconsistency with facts, that one must meet with the same conclusive faith, as the present theory of the solar system, which has been established by this identical species of reasoning. Let us examine whether the first supposition *is consistent* with all and every appearance.

If the body were uniformly in the condition of health—a condition to which many medical philosophers, erroneously confine their inquiries—mere pores in the arteries, would probably account for all the phenomena which could come to our knowledge. Health, implying a moderate and uniform distention of the vessels, we should never, in that state, be able to ascertain whether corresponding enlargement of the pores would accompany an enlargement of the vessels. The blood would be flowing in quantity always the same; and similar particles would be continually separated, and pass away by the lateral openings. But as it is known that the vessels *do not* retain an invariable capacity, it is impossible that a structure, so simple as the one supposed, can account for the fact, that such variation of distention, does not necessarily alter the *quality*, but the *quantity* of the discharge. On this hypothesis, why do we not frequently meet with exudation of arterial blood, in many violent, yet common distentions? And why is the surface of the body invariably dry, when great heat and redness manifest an expansion of the vessels? It seems to me, gentlemen, unnecessary to proceed farther, in exposing the fallacy of this unfortunate theory.

I have before remarked, that the vessels, imbedded in the tissue of our structure, must necessarily derive very considerable support from the parts around them. This support must be particularly great in the dense membranes, in the skin, and in the firm and strongly covered glands. In such parts, any increase of vascular fulness, must produce a corresponding increase of resistance from the immediately surrounding substances, so that *tenseness* and *hard-*

ness accompany inflammation, precisely in proportion to the loss of strength in the inflamed vessels. Now, on the conjecture that numerous exhalents come off from each arterial filament, and with lymphatics and minute nerves, lie convoluted about the blood vessels, it is manifest, that under great distention of the arteries, sufficient room for exhalation, or secretion, will not be allowed. When vascular contraction is greater than in health, provided it is not total, all secretions must be increased. I know that this theory is in opposition to the common language of medicine, which I hold to be exceedingly erroneous. Nothing is more common, than to speak of *determination to the skin*, for the purpose of inducing perspiration; but if this were true, why does it always happen, that sweat only succeeds to such determination, as after feorile excitement? Why does it not accompany that stage? Such language is so palpably in direct opposition to a thousand truths, that it is even too gross, for the huge mass of unmeaning jargon, in which almost every medical work abounds.

The skin then, consists of innumerable capillary arteries and veins, with still more numerous exhalents, lymphatics, and nerves convoluted about them, together forming a sort of delicate net-work, and imbedded in condensed cellular membrane. From this structure, that of the glands does not materially differ; the places allotted to their reception and the addition of a duct and its subdivisions, causing a difference merely in the juxtaposition of their component vessels. The peculiarity of the *internal* surface—the stomach and bowels—arises solely from the muscular and active substances in which the vessels are imbedded, and the profusion of absorbents which accompany the capillaries. The general principles detailed above, apply, however, to all parts of the body where the secerning functions are performed.

From what has been said, we are to expect from a preternatural distention of the vessels of a part, *tenseness, swelling, redness, increased heat, pain*, and *dryness* or *suspension of function*, constituting INFLAMMATION. Arterial distention may, however, be so extensive, that the violent fulness, which is requisite to produce a sufficient number of the characteristics of inflammation, cannot be supported by the heart and large vessels. As an example in illustration of this proposition, we will suppose that the vessels of the whole surface of the body, are uniformly distended by some cause

of universal application, to a degree, capable of circulating a quantity of blood, double that in health. The question immediately arises, from whence can this additional quantity of blood be derived? I answer, from two sources, and two only. First, from vascular contraction in other parts, aided by a more rapid circulation, producing a consequent diminution of blood *internally*—or, secondly, from *plethora*, or general superabundance of blood, prior to the external distention. Let us hastily examine each of these, in the order they are mentioned.

It is evident, that the circulation of health is a forced condition. The arteries being contractile, if no power were continually forcing columns of blood into them, in rapid succession, they would necessarily collapse, or contract to a very considerable degree. It therefore follows, that if a diminution of resistance takes place in a large surface, the great mass of blood will be directed to that part; and all the arteries not directly subjected to the injurious cause, will *contract*, until the sum of general resistance again becomes equal to the power of the circulation. But there is a limit to all contractions; and therefore, however disposed the vessels of the surface may be to unlimited relaxation, there is evidently a limit to the supply of blood, which can be afforded them. It is not so, when the distention is circumscribed, and confined to a comparatively small part, as in inflammations: a *very moderate* contraction in all other parts may, in such cases, produce a supply of blood, capable of even destroying the distended vessels by gangrene or suppuration. Thus, when the inflammation is confined to small spots, from the peculiar nature of the injurious cause, however numerous they may be, the accompanying swelling is excessive, constituting *pimples*, which generally terminate in *pustules*. Here we have an important law of the circulation, viz: that the violence of distention, is always inversely proportioned to the extent of the affected part, supposing no cause to interfere with the simple order of nature.

Plethora, or *general* fulness—for I hold it absurd to admit such language as local plethora—frequently exists and subsides without materially interfering with the vital or animal functions. When present, we need hardly remark, that great distention may be supported on a large surface of the body. But it is important to observe, that the difference between the distention from natural contractions in other parts, and that combined with plethora, can rea-

dily be detected, by the distention being, in the latter case, greater than the constitution would permit under other circumstances, particularly when considered in regard to its continuance in *time*.—Thus, without plethora, internal contraction, sufficient to keep up so much heat and fulness of surface as are frequently exhibited in the febrile stage of an intermittent, could not be supported for a period of several days; corresponding relaxation always succeeding to violent contraction, in a time, *inversely* as the degree of external relaxation. We are, therefore, always to conclude in long continued violent excitement, that there is, whether from the commencement, or arising during the illness, a superabundance of blood. The curative effects of blood-letting, exemplify this principle—though generally attributed to the abstraction of the great stimulus of life, they are truly founded on the greater violence of internal contraction, which must follow a reduction of the vascular contents—a state absolutely necessary to a natural collapse. That plethora does frequently, nay, generally, arise during a long continued illness, is reasonable to suppose, since much fluid is then received into the body, and the natural excretions are much diminished, and violent plethora is itself a disease, with which fever—as I shall more fully explain hereafter—is sometimes incompatible; that is, as regards the preparatory stage, and in consequence the febrile.

There is one circumstance which occasionally attends inflammations, and requires careful and enlarged inquiry. I allude to the condition of the PULSE, so generally regarded as a primary indication of many forms of disease. It is a well known fact, that moderate local inflammations, at a remote distance from the heart, never present those symptoms known by the name of fever. At the same time, it is likewise fully established, that extensive inflammations, particularly of the internal viscera, are always attended with general excitement. To explain these interesting facts, it will be necessary to bear in mind, the principles detailed above, and the structure of the vascular system. Now, if the capillaries of one arterial subdivision become liable to distention, a contraction of neighboring subdivisions will supply the necessary blood, without any increase in the general branch supplying all the subdivisions; and consequently the effects of the derangement can proceed no farther towards the heart. But you will readily perceive, that as the relaxing capillaries extend over a larger surface, and among

the minute filaments of many subdivisions, the effects on the general circulation, must extend rapidly towards the common centre; until at length, the natural contraction of all remaining capillaries, other than those distended, must be called into requisition, and the heart itself will partake of the excitement. The vascular trunk immediately supplying distended capillaries, must necessarily circulate more blood than in health; but this additional blood is supplied by other branches of the artery, from which this excited trunk comes off; whilst the great artery itself, need not alter its natural condition. It is not so when, for example, the capillaries of an extensive surface,—as in the stage of febrile excitement,—become distended. In such case, the minute subdivisions of a very large number of arteries, which can communicate with the diseased vessels, only through the *aorta* or the *heart*—must contract, and a more rapid circulation take place, producing *frequency of pulse.*—The nearer to the centre of general union of all the arteries the inflammation is situated, the sooner will the heart become involved in the derangement. If, for example, the general surface of the *liver* be attacked by some cause, relaxing the capillaries, the *hepatic artery* must soon be excited—which artery being a branch of the *cœliac*, can communicate with but few healthy vessels except through the aorta itself.

But though the heart will, in such cases as call for a change of circulation in the aorta, manifest some disorder from the commencement of the change, the derangement will commonly amount to no more than irregularity, or some slight degree of increase or decrease of the frequency of pulse. The *sum of general resistance*, must be either augmented or diminished, to produce a material change of the frequency of pulsation. When there is less resistance, the round of the circulation will evidently be completed in less time than in health; the heart will be more rapidly filled with its stimulus, and the pulse will be increased in frequency. But when a collection of capillaries become, from any cause, disposed to relax, and consequently all, or many others are about to contract, it is clearly obvious, that a moderate decrease of general resistance must take place, and be maintained throughout the disease. A sort of compromise, between the heart and the contracting vessels, both equally calculated for immediate change of action, will, under ordinary circumstances, take place to remedy the evil; and

therefore, the increased supply of blood, required by the relaxed capillaries, will be furnished by a contraction of other vessels, and a more rapid circulation by the heart. Now, when the surface of distention is of small extent, the changes of the contracted vessels, or of the heart, will not be perceived by our senses; and thence it is, that fever is said never to attend moderate external inflammation.

The symptoms which I have included, under the name of fever, almost always attend the *height*, as it is termed, of all considerable inflammations, whether external or internal. After the contraction of the healthy vessels, to furnish the requisite supply of blood for distention, has continued for a length of time, inversely proportioned to the violence of contraction, debility must take place in them, and distention must follow, by blood from other parts of the body. This indirect vascular condition takes place in all cases; and often relieves the primarily distended capillaries, producing a cure by *resolution*, but always diminishing the total amount of vascular resistance and calling for a more rapid circulation. But if, as may occur in slight local distentions, only a small number of healthy capillaries have contracted, when they relax, their supply of blood may be furnished by other vessels without involving the heart, and an equilibrium of circulation at last ensues, by uniform diffusion of vascular relaxation, throughout the whole system, which is the only condition favorable to a natural resuscitation of tone.

The heart is evidently an organ of immense power; and power is never provided but to overcome resistance. Where are we to look for this resistance? It can exist no where but in the round of the circulation; and as I have before stated, particularly in the minute division of the aortal column of blood, in the capillary system. The resistance here is to be attributed to two distinct sources—1st, That belonging to the inherent contractility of the vessels themselves—2d, That belonging to the more or less unyielding character of the substances surrounding the vessels, and the external compressing powers, which may occasionally resist powerfully, an expansion of the minute capillaries. Now if, from any cause, the sum of general resistance be considerably diminished—for example, by debilitating the vessels of a large surface, either by percussion, friction, or over stimulation, to so great a degree, as to render the limited contraction of all other vessels in

the system, insufficient to supply the necessary distention—it is clearly evident, that the column of blood expelled by each systole of the heart, will be more readily received by the aorta, and therefore in a *shorter time;* and thus is based the proposition of increased frequency of pulse from vascular expansion.

The converse of the above proposition, that is, when the sum of general resistance is *increased*, the pulse must be less frequent than before, is proved by the same course of reasoning, which it is unnecessary to repeat.

It is a beautiful part of the delicate constitution of our physical being, that while life exists, whether in sickness or in health, the power and resistance of the circulation must be precisely balanced. But the means by which this necessary equilibrium is supported, are so various even under the spontaneous operation of the laws of nature, that the constitution, and the very organization of the system, are often wonderfully changed. The infant comes into the world with a circulating power in the heart, which had been carrying forward its blood, whilst the whole body was under the powerful compression of the uterus and waters; and in addition, must have caused the circulation of the equally compressed and far distant placenta. Deriving the tone of action from the mother, we have good reason to believe, that before birth, the frequency of pulsations is regulated by the maternal heart; but no sooner does birth remove the powerful resistance of the uterus, than the heart beats as in the feverish pulse of an adult, though the former resistance of the placenta is rendered total by the ligature and knife.—Then are manifested the necessary consequences of this first and most surprising metamorphosis; the external vessels, indeed all, but more particularly the external, are absolutely engorged. The external supporter of the vessels, having been much diminished, is compromised by a distention of each capillary, until its fibres resist further reception of blood. This state of body, however, gradually passes away, by the effects of growth in extending the surface of general circulation, and by the increase of density of our fibre; until a period arrives, when the portion of resistance, furnished by the vessels themselves, compared to that furnished by all other sources, is most favorable for the reception of external impressions, and therefore, for the complete exercise of the faculties of body and mind—a period to which we give the name of *maturity*.

The pulse is calm, temperate and uniform; the complexion and features seem likely to be permanent: indeed we can have no difficulty in detecting that condition of body which essentially contributes to all that is majestic or valuable in the character of man.—Soon, however, the heart becomes relatively enfeebled: the external vessels, and all the capillary system, contract; the skin at last, becomes shrivelled, on account of its almost empty vessels; all delicately organized parts, the *eyes*, the *ears*, the *glands* fail in their functions, until at length sufficient energy cannot be supported by the heart, to prevent the resistance of the capillaries of some vital organ, from becoming total, and *death* necessarily follows. In infancy, the external supporters of vascular resistance are of immense service. Could they be increased by pressure, &c. who could calculate the relief to them, or the consequences in preventing the evils that await early life? At maturity, we seem to be almost independent of external support; but old age is unquestionably hastened and rendered more irksome, by the continuance of external compressing power. In the evening of life, the contraction of the vessels, is alone sufficient to prevent distention by the heart. It is, therefore, a truth, though strange, and apparently inconsistent, that the very powers which are vitally necessary to the infant, are absolutely destructive to the aged.

But notwithstanding these great and uniform changes of our very being, by the uncontrolable course of nature, they form but a small class, when compared with the variety of alterations, both partial and general which more or less frequently affect every living being. The changes produced in the muscular fibre, by the influence of some mechanical trades, and the whole theory of HABIT, which radically depends on the effects that long continued actions, and fixed positions,—in the great proportion of the system not under the control of the will, as well as in the voluntary muscles,—must have, on the capacity of the neighboring vessels, necessarily followed, in all cases, with a change in the quantity of deposite from exhalents, and an increase or decrease of absorption. This subject, though interesting and highly important, I am compelled, by the want of time, to pass over. And I regret this the more, because in the many long protracted cases of our autumnal disease, which so frequently baffle every attempt to relieve, I cannot doubt, that the only real difficulty, consists in the mode of morbid action

becoming habitual, through the previous modification of secretions and absorption. The whole doctrine of *chronic disease*, likewise depends on the same principle, and many disorders of that description, are often the sequel of our epidemics.

The language of medicine is yet so imperfect, that it is often difficult, from this cause alone, to detail the most obvious phenomena. I can hardly, therefore, hope that the preceding explanations regarding the theory of the circulation,—the most abstruse and important subject connected with our science,—is sufficiently clear.—I will therefore, still further trespass on your time, by way of recapitulation, before I proceed to the particular object of this discourse—the autumnal disease; expecting to apply the general principles of the circulation to a complete elucidation of its very various, but still connected forms.

I have used the terms, increase and decrease of the sum of arterial resistance; and again, I have stated that an equilibrium of power and resistance, must be supported during living being. Lest some confusion may arise from this apparent inconsistency, I will now again observe, that there are several sources of this resistance, any one of which being removed or diminished, in any part of the system, must be followed by increased fulness of that part, and this fulness compensates for the loss in the supporter of resistance, thus removed or diminished. An equilibrium is obviously sustained in all cases. If, by any capable cause, the vessels themselves are debilitated, they distend, until they can distend no farther, or until the substance in which they are imbedded, resists further fulness. Again, remove the compressing power of the atmosphere, from a part of the body, by means of the air pump, the vessels of that part distend. So it is in every possible case; and I, therefore, base my doctrine of inflammation and fever, on the literal signification of the term—a diminution of *vascular resistance.*

The laws of power and resistance, as they are evidenced in the phenomena of all created bodies, thus seem to me, to govern the events which take place in living beings, whether in the one condition of health, or in the many of disease. The love of the marvellous, which seems to have instinctively led our illustrious fathers to a mysterious opinion of animation and health, should, at this advanced period of human intelligence be banished from the mind: and nothing, however plausible, that is founded on ought but fact

and reason, should be allowed to occupy a place among the rudiments of any science, more especially of this, the science of life and death.

Having now taken as concise a view of the theory of the circulation, as the importance of the subject would permit, I will now proceed to elucidate the pathological phenomena of *simple agues*, pointing out, at the same time, the coincidence between them, and the more complex forms of our autumnal disease.

So far is fever from deserving the name of a primary disease, that in all cases where it is manifested, there must necessarily have preceded another form of morbid action: this we denominate the *preparatory stage*. In an ague, this stage seems to be of limited duration, being soon followed by the stage of excitement, and then by the collapse. There is, however, in this morbid preparation, nothing whatever, which is necessarily connected with a fixed period of time: for I have not the least doubt, that months may be occupied with ushering in a stage of excitement. But it is obvious, that the duration and violence of action, must be inversely as each other. The symptoms too, vary much in the ague, and in those tedious but slight interruptions of health, which always precede a long and uniform attack; but mere appearances are not, in this case, to impress us with the belief of radical difference.

In the ague, the preparatory stage is commonly of short duration, though violent in degree, and may be defined, in short, *a violent, external, capillary contraction*. This contraction more or less violent, constitutes the proximate cause of all the preceding derangements of system, which are followed by the symptoms of fever.

I am not now to inquire into the external causes, by which the capillaries are brought into this situation. It is sufficient for the present, to be convinced that it actually exists, and is the foundation of all the morbid appearances attending the stage. That it exists, is absolutely demonstrated by the shrivelled skin, coldness of surface and shrinking of external vascular parts. That it is the basis of all the characteristic symptoms, which observation has attached to an ague, can be readily proved. Thus the consequent internal fulness of the vessels, is manifested by head-ache, pain in the back, precordeal oppression, pain in the large viscera, or in any other internal part, which from some accidental predisposition, may be more particularly disposed to receive the internal regurgitation of

blood. It is precisely owing to such predisposition, and not to the abstract nature of the disease, that so much variety is observed in the minute phenomena, attending even intermittents.

The symptoms above enumerated, often exist together, and are clearly and decidedly manifested. Such severity is not, however, essential: indeed, they are often so moderate, as to be scarcely perceptible to our senses. In such cases, the vascular contraction must continue for a long period of time, before the indirect debility of the minute vessels comes on, and changes the whole appearance of disorder. Thus it often occurs, that a mere lassitude, paleness of countenance, with slight head-aches, transient pains in different parts of the body, costiveness, &c. last for days and weeks, with little variation, before the stage of excitement is developed; and in this country, we have abundant cases of all possible grades of the preparatory stage, between these two extremes.

In the ague, the preparing process, having continued as long as the contraction of the superficial capillaries can last, at length yields to the stage of excitement, which consists, simply, in that expansion and distention of the minute vessels, which must follow unnatural contraction. This distention must proceed to a degree as far exceeding the fulness of health, as the previous contraction was beyond that point. We, therefore, observe a florid and tumid surface, heat, dryness, and all the appearances which I have before shewn to depend on unnatural, vascular fulness. Internal oppression and pain subside, and a change, from one extreme of morbid action, to that directly opposite, often thus suddenly takes place.—But many occasional causes may interfere, and prevent this natural and essential change from occurring, without frequent interruptions, of chilliness and fever, alternating for some length of time, until the final and complete expansion of the external capillaries ultimately triumphs, and we have a combination of symptoms well known by the name of Fever.

The duration of the stage of excitement, must be proportional to the violence of the stage of preparation. This fact, I apprehend, has only been questioned by those who have not reflected, that subject as we are to innumerable injurious agents, it must often occur, that this proportion may be modified by the retarding or hurrying of the stage of excitement, and yet be radically true. Indeed it is a matter of surprise, that it does sometimes occur, that this de-

pendence of the second on the first stage, in point of duration, is clearly manifested, and it does not only sometimes, but frequently occur.

To support the external determination of blood, internal vascular contraction must take place, which, as before, can last but a certain time, and is necessarily followed by a reflux of blood, back from the external circulation; this constitutes the stage of *collapse*. It is important to observe, that there is a material difference between the internal and external contractions. The superficial vessels having expanded from their own debility, are readily filled by the comparatively healthy internal vessels, in the commencement of the febrile stage; but the internal vessels, now relaxing from *their indirect debility*, are to be filled by the *external exhausted circulation*, and consequently, are only so far filled, as to restore the equilibrium of natural distribution. While this process is going on, we have termed the period COLLAPSE; and when completed, the state which follows the *apyrexia* or *intermission*, which, but for the general exhaustion, would be health.

The symptoms characterizing the stage of collapse, are the general and gradual subsidence of the heat, tumor, dryness, and redness of the skin, and frequency and fulness of the pulse. In all cases of rapid collapse,—which is generally observed in intermittents,—instead of a mere restoration of the natural, insensible perspiration, a profuse sweat attends. This is wholly attributable to a more than healthy regurgitation of blood from the surface, back to the internal vessels, leaving more room for the exhalents to pour out their fluid, than in health: in such cases, we find a corresponding fall in the temperature of the skin. Sweating is, therefore, an evidence, and an evidence only, of violent collapse; and is, consequently, not absolutely necessary, but even in many cases, alarming.

When the preparatory stage has been of that slow and protracted kind, belonging to what are erroneously called continued fevers, the stage of consequent excitement may be of any duration. Because, the external capillaries never having contracted violently, are necessarily a long time in completely yielding to distention, even after the distention has commenced. The disposition to internal relaxation may, therefore, be deferred an indefinite length of time, before the stage of collapse can set in. The collapse, in

such cases, can never be as decided or uniform, as in regular intermitters.

What are termed simple continued fevers, do not, therefore, differ essentially from intermittents. They have the same distinct stages, though complexity of cause may interfere with their regularity; and that the former shew no disposition to regular returns, is perhaps, a hasty conclusion, since in our country, at least, a disposition to what is termed *relapse*, is evidently manifested in many individuals, at periods inclining so much to regularity that—allowing for the myriads of little interfering circumstances which must occur in long intervals of time—I have little doubt, extended observation will prove the law to be of universal application. Thus, you will find, that many persons, subject to habitual agues, have an interval of a fortnight, or three weeks between the attacks, the same interval with the same individual; another class, subject to more complicated forms of the disease, are apparently more obnoxious to it, at regular periods; but this I merely suggest at this time, to be confirmed or disproved by your future observations.

The simplest form of ague, is that in which the internal regurgitation of blood, from the external vascular contraction in the preparatory stage, is not invited, by peculiarity of constitution or acquired predisposition, to any one organ in particular. In such cases, very many of which annually occur, our means of relief are generally certain and permanent. But in those however, which have some local predisposition—and which, unfortunately are likewise common—the disease assumes peculiar symptoms of never-ending variety, according to the local determination, and great diversity of constitutions, but which may be safely classed under the appellation of *congestive agues*. A protean class of other forms of our autumnal disease, may also be imagined, though never described, in which this congestion is a leading or fundamental quality. Thus, in some cases, the *brain*, in others the *liver*, the *spleen*, the *stomach*, various parts of the *intestinal tube*, the *kidneys* and other glandular bodies are often particularly affected: indeed there is no part of vascular construction, that is not occasionally the seat of local congestion. But to say, that any one part is always, or even commonly attacked in this way, or that a majority of cases are of a congestive character, would be to advance that, which my observation will not justify, considering the large proportion of trifling cases in a year's disease.

Although it is generally believed, that agues never jeopardize life; and that, however violent, they at length leave the patient spontaneously, yet perhaps, there is no popular prejudice so far from truth. The error has originated from the influence of mere names, and an entire ignorance, even among the profession, concerning the theory of DEATH. As a correct knowledge of this point, will throw much light on the subject of this essay, I will briefly suggest a few illustrations.

Death, in a physical point of view, is merely the suspension of living motion; and living motion depends on the simultaneous action of a large number of mutually dependant organs. Among these organs, there are many which, if momentarily suspended, put a final period to the life of the whole circle; such are the brain, the organs of circulation, respiration, &c. Now, any organ may be so engorged with blood, as to be incapable of performing its function; and when this occurs in the *vital organs*, death must necessarily ensue. So when from great external determination, the internal organs are left without a *sufficiency* of blood, their functions must cease, followed by death. A little reflection must convince you, that death from any form of morbid action, is immediately caused by the loss of one or more of the functions, necessary to the continuance of vital operation. It is absolutely impossible, that death can proceed from any other cause. That fatal disease of children—the *croup*, for example—is only a remote occasion of the many deaths which follow it; the immediate cause being, in all cases, either the suspension of respiration, or of some other equally important function, from the violent efforts of the patient. It is, therefore, a gross mistake that congestive agues—from which, fortunately, very many recover,—because the majority of the cases of internal congestions are seated in organs, not immediately vital,—are never attended with danger. Indeed,—I now state the *fact*, for fact it is beyond all question,—the most violent and dangerous attacks of the disease of our climate, which have been, I am sorry to assert, both numerous and almost uniformly fatal, are those cases in which the onset so resembles the preparatory stage of an ague, that it is impossible not to believe them identical; but in which, from some interference, or merely from the violence, reaction never comes on. The second or real febrile stage is suppressed, for the simple reason, that the injury done the internal vessels, by the

violence of external contraction, has so destroyed their power, that although the patient may live for many days after the attack, yet the surface of the body, and the extremities will remain cold, and violent oppression at the precordia, almost suffocate the miserable patient; death at last succeeding to the total suspension of one or more of the internal functions, without any symptom of excitement of necessity attending. These cases of congestion, unattended with fever, are among the most formidable which belong to the autumnal disease. I have known several cases, in which the whole process has been so rapid, that patients, after having themselves made a fire, preparatory to an expected ague, have died, whilst shivering with the cold, in excessive internal misery. But it more frequently happens, that a week or ten days elapse, before the powers of life are entirely overcome. Among such cases, one will be accompanied with violent delirium; another, with every symptom of peripneumonia, except the precise character of the pains; in another, we shall find the back in particular disorder; in others, the bowels, while the remaining organs of the body seem little deranged. In all, however, dissimilar in appearance, we have a morbid identity, founded on the principle of congestion.

It is yet a problem of interest, whether death ever attends, completely developed excitement, that is, excitement unattended with congestion. That violent external determination, if suffered to continue, would, by deriving too much blood from internal parts, suspend some of the functions, there can be no doubt. But as we possess abundant and powerful means, for forcing on either a favorable or fatal collapse, it has appeared to me, that death seldom, if ever, depends on the stage of excitement, as its immediate cause. The periods which prove, by far the most fatal, are the congestive preparatory stage, and more particularly the collapse.

I have been called to many cases, in which the attendants of the sick, have been utterly astonished at the excessive sweating, coldness, oppression or delirium which followed, as they thought, mild and common ague. The patients were able to move about, and in many cases to work, perhaps at noon, and at midnight were dead.—Other cases, in which the same, but less rapid events occur, are frequently in appearance mild remittents, in which the remissions are so well marked, and the exacerbations so moderate, as to occasion no alarm, when, unexpectedly, a cold and profuse perspira-

tion, with delirium or stupor, or with severe oppression in some part of the body, is observed, evidently constituting a too violent and rapid collapse. A large proportion, even of these, from mistaken treatment, never recover, though the unfortunate sufferers may continue, more or less, in the same situation for many days.

That the collapse, from excitement, should sometimes proceed too far, cannot surprise us, when we reflect, that the internal vessels are much debilitated, both from long continued increased action of the heart, and their contraction during the excitement; and though the external vessels, which supply the blood for regurgitation, have been likewise debilitated during the stage of preparation, they must often, particularly after a long period of fever, recover *tone* enough to possess, when compared with the internal circulation, an over-proportion of strength—a disparity which must necessarily be attended with alarming consequences. In an ague, the whole chain of events takes place in so short a period, that the external capillaries have not, during their stage of distention, sufficient time to recover any considerable or dangerous portion of the power to contract; so that it rarely happens, that alarming appearances attend the collapse of intermittents.

It may be asked, if by this recovery of tone, the external vessels are enabled to contract, why does not a preparatory stage immediately set in? I answer, that such preparatory stage does frequently follow the collapse, immediately, constituting one form of the disease, denominated *remittents*. But the degree of disproportion of vascular strength, between the internal and external vessels, is more frequently, so moderate, that no sensible reaction can follow, and yet produce all the consequences, specified above—the internal vessels, it must be recollected, being already exhausted.

Another source of complexity in the cases annually occurring, consists in the occasional occurrence of *inflammation*, in some internal part. There is nothing more frequent, in severe cases, than conclusive evidences of inflammatory action in the stomach, the liver, the lungs, or the head. Such inflammation, however, does not present the same pure and unequivocal routine of symptoms, as in that arising from cold or other simple causes, and has therefore been termed by Armstrong, *sub-acute*. Although, when these occur, they necessarily produce some variety in the general countenance of disorder, yet the cases do not differ very widely from con-

gestions. When the capillaries of an organ receive all, or a great part of the blood driven from the surface, in the stage of preparation, it is obvious, that inflammation of a very high grade may ensue, which, once established, must prevent the full development of the subsequent external excitement—and thence a coldness of surface will commonly attend, with a small contracted pulse in those arteries supplying superficial capillaries. When this condition of things is excessive, there will be a cold moisture of surface in addition to the above symptoms, together constituting the range of epidemical disease, known by the names of "Pneumonia typhodes," "cold plague" of this country, &c. which were, in former years, of frequent occurrence. I have lately attended a case, in which a phrenitis was most clearly manifested, in connexion with the usual symptoms of a tertian intermittent, in which a cold perspiration continued, more or less, during the whole course of the disorder, and gradually abated with the general improvement of symptoms.—In this case, the attack commenced with *rigor*; after its continuance for an hour or more, the patient fell from his chair, and immediately manifested the most violent delirium, which continued with little variation, through the succeeding remission, and several distinct, but somewhat suppressed paroxisms, which followed with their wonted regularity. It is remarkable, that during the whole disorder, the tongue and pulse, exhibited but little evidence of derangement. Similar cases are comparatively frequent in the Miami and prairie countries, where the physicians speak of them, as pure disorders of the stomach—a statement, which I frankly confess, is beyond my comprehension.

In these cases, you will perhaps, discover nothing by which a distinction may be drawn between congestion and inflammation, or in other words, by which you can readily determine, whether the local fulness is confined to the capillaries, or to the whole circulation of the affected part, save the acute pain, generally attending internal inflammation, contrasted with the dull oppression incident to congestion, and the more fluctuating character of the latter condition. But this distinction is of little practical importance, since both call for the same remedial treatment, and are equally deserving of the most serious attention—inflammations being, perhaps, more frequently fatal, on account of the dreadful terminations of suppuration, mortification, scirrhus, or adhesion, which frequently attend them.

I have now attempted to point out several radical forms, in which our autumnal epidemics are presented to us. 1st, The *simple intermittent ague.* 2d, The *congestive ague*—to this may be annexed the *common remittents*, which, when deserving any distinction, are merely intermittents, suppressed or impeded by occasional causes. 3d, The *permanent preparatory stage*, always violently congestive. 4th, The *permanent collapse*, either accompanied with congestion or inflammation. And 5th, The *inflammatory ague*, or *remittent.*—To these we may add a 6th, consisting of such cases as, after a protracted stage of preparation, relief is obtained either spontaneously, or by art, and the other stages succeed with regularity. I do not, however, offer this as a nosological arrangement. I am, indeed, too sensible how imperfect it is, since there must necessarily occur, many cases which it will be difficult or impossible to refer to one head or to another. The disease is so truly one connected chain of morbid action, the innumerable links of which so run into each other, that all classification must, necessarily, be artificial and unnatural. The above descriptions must, therefore, be considered only as so many parts of the great chain, in which considerable differences are to be observed.

In the above arrangement, I have not included that peculiar disorder, of which, in this country, we hear so much, but see so little—the Typhus. There is no term which, since its introduction, has been so much contorted and confused by all attempts at illustration. When we hear some physicians applying the term to permanent collapse, or even to the symptoms attending the protracted stage of preparation, or to those cases which, instead of the occasional presence of delirium, are accompanied with a disposition to stupor or sleep, or to suppressed general excitement,—when we find the celebrated Armstrong, in his work on this subject, including almost all possible forms of preparation and excitement, under the general appellation; and in his lectures, discoursing of intermittent typhus—we must really conclude, that the name is worthless, in its present undefined situation. Accustomed to that singularly uniform disorder prevalent at the east, in the colder seasons of the year, to which the name of Typhus is by common consent applied, I have no hesitation to assert—that being the standard of the signification of the term,—that in our epidemics, we find nothing that deserves the name. The *Synochus* of Cullen, or the typhus of the eastern states,

though always alarming and frequently fatal, is really a much less horrible disorder, than a large proportion of our congestive cold stages, or the frequent cases of our dreadful collapse. It is rather remarkable, that the popular impression, regarding typhus, is such, that it operates as an encouragement to some practitioners, to continue the mysterious use of the word, as an apology, for the ill-success which must frequently attend all human efforts to relieve.

I would not, however, be understood to assert, that this term has always been as obscure as it is at present; indeed, when confined, as I believe it formerly was, to *general vascular exhaustion*, it is still a useful and expressive term. It is precisely on this definition, that Armstrong must base his anomaly of intermittent Typhus, although I do not know, that he would thus define it. I have elsewhere shewn, that when violent external contraction has exhausted the contractility of the superficial vessels, a state of internal vascular contraction must follow, constituting the stage of excitement; and that this internal contraction must likewise be followed by debility. Now, after the collapse of simple agues, a period must evidently succeed, in which, both the external and internal circulation,—when compared with that of health,—are enfeebled and relaxed; and this period, being that of the *recovery of general vascular tone*, is essentially typhus, according to my view of the subject.—It is, in all probability, owing to this state of the circulation, that a certain time must elapse after a complete intermittent ague, before the external vessels can again contract, preparatory to a recurrence of the paroxism. The period I have first described, is Typhus, though of the mildest form, cognizable by our senses, and yet evidently accompanied with many of the symptoms universally admitted to characterize that affection, viz: feebleness, a disposition to stupor or sleep, listlessness, &c. In more aggravated attacks of simple fever, after complete collapse, we find more serious vascular debility, accompanied with other, and more serious symptoms, and when the condition is excessive, the general vascular exhaustion is manifested by small *echymosis*, or petechiæ in the skin, and by hemorrhages from abraded parts, and the internal organs. Thus typhus is no more a fever, than the cold stage of an intermittent is a fever. It is, as far as we know at present, always consequent upon disorders, in the progress of which, fever has appeared, but it is a confusion of language to speak of it as a fever. It may, in-

deed, be complicated with the local sequel of fever, such as the remains of congestions, &c. which give some variety to the symptoms; but it is, essentially that period after collapse, which calls for the vigorous use of *Tonics*—a period incompatible with fever, or with much local congestion or inflammation.

The languague so often used, of an attack of fever, "becoming typhus," a patient "falling into typhus," &c. *can* or *should* mean nothing more than that a collapse has taken place, or is about to ensue, which will leave a state of general vascular debility, so much greater than that after an ague, or greater than the natural powers of life can overcome, that we are called on for a vigorous use of all our tonic and resuscitating remedies.

But it may be suggested, as an objection to this doctrine, that in countries where typhus is admitted by all to occur, it is frequently manifested from the commencement, or soon after the commencement of illness. This I positively deny. It is an error of our senses, or of observation. In such cases, who can say, the patient has not labored for months before, under the two first stages of the disease? Indeed, it is notorious at the last, that a long but slight indisposition is generally manifested, previous to the violence of attack. I dwell on this subject, gentlemen, because it is of immense importance. It should lead to a system of anticipating treatment, and banish that enervating surprise at the prostration, which is apparently so sudden, that common sense must revolt at the suggestion of its being the result of a moment.

It is precisely from such long protracted, and slight modifications of the two preceding stages of the disease, that sufficient general vascular debility, to alarm by its violence, and continue a length of time, can follow. In the disease of our fall months, so rapid in their course—so mixed with inflammations and congestions, which if I may use the expression, monopolize the vascular debility—that general exhaustion, if it occur at all, after the collapse, is of short duration, since it is obvious that so short a period as ten or twelve days, can hardly destroy the powers of life to such a degree, as when all disorder shall be removed, the system will not renovate itself—I have met with but very few cases in this country, which required much assistance during the period immediately after the collapse, when all congestion or inflammation had subsided. They all seem,—to use a vulgar expression,—to get well of themselves; and that often as suddenly as was the onset of the disease.

Typhus, then, is the result of long continued simple excitement, and cannot be considered an idiopathic disorder. We know of no sedative power, capable of so prostrating the vigor of the human constitution by direct means. It is incompatible with excitement, and can only exist, after the loss of considerable power, in all the divisions of the circulation.

This condition of system, therefore, so rarely follows the rapid and complicated disease of the Western country,—though I have seen several cases of its genuine form during the winter months of 1820–1 and 1821–2—that it may be laid down as a general law, that it has no connexion with our epidemics. Indeed, it would be fortunate for our country, if the collapse of our autumnal disease, were even commonly so complete, as to call for the vigorous use of stimulating restoratives; whereas, it too generally occurs, that congestions and slight inflammations, remain after the disease, which, instead of admitting of the tonic treatment, call for depletion, and stimulating food must be proscribed. I firmly believe, that much injury has resulted in this country, from the prejudice, even among physicians, that there must be radical debility, incompatible with depletion, after an attack of the disease. A distinction should be made, in all cases, between *apparent* and *actual debility*. I have known many individuals, who had been harrassed by frequent returns of intermittents, and relapses of more serious forms of the epidemic, who were relieved, as by a talisman, by repeated blood letting. The popular impression, arising from the peculiar nature of the autumnal affection, that a patient or convalescent may recover too rapidly, is a vulgar observation fraught with important instruction, to physicians themselves; and as the forced suggestion of mere experience, is fatal to the general notions on typhus, prevalent in the Western country.

Our annual epidemic, in whatever shape or form, as it evidently arises from a cause or causes, to which all are subjected, has one characteristic phenomenon, viz: the disposition to the nature of simple ague; and manifests, more or less distinctly, the Three consequential and mutually dependent stages, which only appear more remarkable in intermittents, because no peculiarities of constitution, or no interfering occasional cause, suppresses symptoms or otherwise modifies the disorder.

The manner in which, while speaking of the circulation, the transition from stage to stage, was described to take place, derives

additional confirmation from the operation of the means of relief which experience has proved to be generally successful. Thus an *emetic*, administered in anticipation of an expected paroxism, by violently contracting the stomach, and through the action of the abdominal muscles on the whole internal circulation, gorges the external vessels, and puts them in a condition incompatible with the stage of preparation. So it is, with the Peruvian bark, and other remedies of the same class: by contracting the internal vessels, a fulness is supported on the surface, which must require a more than usually powerful, morbid cause, to produce that degree of external contraction, necessary to usher in the cold stage of an intermittent; and from this reasoning, it is that the bark is injurious, when given during the febrile stage, or so as to remain in the body when the excitement comes on, as its operation must obviously tend to prevent a natural collapse. The stage of excitement is sometimes abbreviated, and the collapse brought on, by such medicines as relax the internal circulation, such as nauseating doses of antimonials, &c. It is unnecessary to proceed farther in this species of illustration, as a thousand examples will be suggested to you, which it would be tedious and a waste of time to record.

The preceding remarks on the *nature* of the disease, having already exceeded in length, the limits of my original design, I must leave the outline I have drawn, to be filled up by your own reflection. I cannot, however, allow the present opportunity to pass, without making an effort to eradicate some of the prevailing errors, in regard to the CAUSES of this annual pestilence; in as much as there is ground for hope, that when the mind shall be liberated by the removal of prejudice, something useful may be expected from future investigation. It is with this view alone, that I venture still further to occupy your attention; freely confessing that I am not prepared to determine with certainty, the actual offending agents, which, for aught I know, may forever elude detection.

A great error, with all inquirers into the origin of Epidemic disease, is an inexplicable disposition to discover, in all cases, a principal and especial cause. Subject as we are to the influence of innumerable agents, it must be obvious, that *peculiar co-existence* of

deleterious powers, must very frequently occur; and in the multitude of diseases which regularly infest various sections of the earth, it is more than probable, that a large majority are produced by such complexity of cause. The want of success which has hitherto attended the indefatigable researches of many enterprising inquirers; and the total darkness in which the sources of all epidemics is still involved,—the obscure and almost mysterious agency to which they are frequently attributed,—are, it would seem, sufficient reason to doubt the premises, upon which all existing theories are founded.

It may, indeed, admit of serious doubt, whether the general character of our being, the wisdom and care so wonderfully displayed in our organization, will allow of that degree of imperfection, which the existence of many solitary causes of disease would necessarily imply. There can be no doubt, and indeed it is tacitly admitted as fact by all medical philosophers, that even the most powerful of ordinary agents, require a certain preparing or predisposing operation in the system, to make any morbid impression. In treating of the causes of disease, authors invariably distinguish, between those that are *predisposing*, and those that actually *excite*, or produce the disorder. But since every alteration of system, whether predisposing or otherwise, is a derogation from health, the distinction above alluded to, though specious in appearance, in reality, signifies no more, than the co-existence, or the necessary succession of causes, in the production of all disorders. Thus it seems that a wise and admirable provision is implanted in our constitution, for preserving tolerable health, though we are surrounded with, and have continually applied to us, substances, which, *in a certain order of succession*, would forbid, even momentary enjoyment.

We cannot, therefore, consent to attribute any affection, however simple, to a solitary agent. There is no doubt, a very considerable difference, in complexity of cause, in different disorders. The number of links which constitute the chain of causation in epidemics, is, in all probability, greater than in contagious disorders. But in admitting the existence of the latter, I merely admit the existence of a chain of morbid cause, in which there is one link more prominent, and perhaps more efficient than the rest. When we inoculate many persons, or there are many presented to one sick with the small pox, are there not always some, who will not yield to the solitary operation of the virus? And what right have we to attri-

bute the exceptions, to the vague and unmeaning terms, of resisting absorbents, or imperfect punctures? There cannot be a contagionist so determined, as to deny a ready assent to the possibility of an individual, resisting the virus of any disorder, though it may have been thrown into the circulation in considerable quantity—an assent, which will at once destroy the self sufficiency of morbid secretions, and in fact strikes at the root of the common doctrine of *poisons*.

From whence have been derived the many disorders which are at this time apparently contagious? To answer this question we cannot be at a loss: they must have originated from a comparatively rare *co-existence*, or a singular *succession* of causes; among which there were, without doubt, many of very common occurrence, which were essential to the combined result: and we know not, but these ordinary causes would, of themselves, be nearly sufficient, requiring only some peculiar external *irritant*, which ever after the first case, can be supplied by the production of the disease itself.

There is one property, which is said by some, to constitute an essential peculiarity of contagious disorders, viz: their non-recurrence in the same individual. It is remarkable, that medical logic will, at this time, admit of attributing that as characteristic, which for aught we know, may have no relation to the fact of contagion.—Those who have paid considerable attention to the phenomena of living bodies, must be convinced of a natural disposition to *conform* to, or become habituated to an innumerable variety of modified existence. Indeed, there is no condition, in which we can be placed for any considerable length of time, but changes conforming to such condition will permanently take place. From this principle, we may reasonably infer, that in the consecutive changes, of which every regular and protracted disorder is a depending series, a conformation to the last condition, will often protect the system, in future, from the first, and consequently from the whole train of morbid action.

The preceding general law of morbid causation, derives peculiar confirmation, from the occasional instances of virulent and malignant disease, which have been a thousand times observed, out of place and season; and to which the name of *sporadic* is by general consent applied. The advocates for specific causes, should reflect, that a single instance of the unequivocal presence of such causes,

without producing its usual effects, is fatal to their doctrine, and an incontrovertible argument for complexity of cause.

That MIASMA, emanating in profusion from the rivers, marshes, and table land of this country, is an essential excitant of our epidemics, there cannot exist a doubt. But I firmly deny its exclusive agency in producing the disease, and the excessive degree of strength that prejudiced imaginations have assigned to it. If I am in error, why is it that this supposed herculean poison, in districts, where it is admitted to be particularly abundant, still leaves many free from its influence? Why in the same family do we find some suffering almost continually, and others entirely exempted? And why do we perceive such an immense variety in the train of morbid phenomena, produced by an uniform and specific agent? *Predisposition*, I am aware, will be offered in answer to these questions; but what is predisposition? surely nothing but an antecedent succession of events brought about by hidden, and in many cases, trifling causes, but occurring in *morbid succession*. There is probably nothing under the canopy of heaven, substance or event, to which, if we be subjected at an unhappy moment, will prove more or less injurious or fatal.

The only correct method of inquiring into the cause of epidemic disease, is to trace the succession of events, which naturally or accidentally precede the irruption of the disorder, and prepare the system for the operation of the appropriate excitants. The usual method by tedious and difficult researches into the nature and sources of an obscure agency or poison, which abstractedly considered, may be feeble or harmless, in ordinary health, has retarded the only promising course of observation, and by a singular delusion, after centuries of indefatigable inquiry, left us no farther advanced than Hippocrates or Celsus.

In tracing these antecedent events, the influence of *season* claims particular attention. By this term, I do not intend to convey the idea of those peculiarities of weather, which have been laboriously and almost uselessly investigated by many; but will suppose, for the present, a perfect uniformity in every year. On this point, there is much blindness of opinion, among physicians as well as the public. I am much mistaken, if there is not a common, an universal opinion, that in all seasons of the year, the human system is essentially,—or as I would rather express it,—medically the same. I am of a very different persuasion; and think that the mode of our

existence, varies in many important particulars, as affected by the temperature of the seasons, rarity of air, periodical change of habits, and by fixed laws of our being not so closely connected with the progress of the year—laws which belong to the same class with those which induce the alternation of watchfulness and sleep.—There is, for example, a general law, though often counteracted by natural or acquired facilities, that would drive all animated creation to a torpid existence during the winter months. This is manifested in so large a number of animals yet in a state of nature, and all well known exceptions, are so evidently attributable to forced efforts of art, that we are compelled to believe, that a similar tendency yet operates, however enfeebled by perpetual counteraction, in every living being. Animals subject to this annual death, have doubtless, during the remainder of the year, corresponding activity, a peculiar vigor of life, and exuberance of health. It is in the human family, and domesticated brutes that we alone perceive a deterioration of physical character, an abbreviation of life, and a multiplication of disorders. Man and domesticated animals alone evade that resuscitation of body, which the winter is calculated to produce, and the summer thus seems to require.—It is remarkable, that the devastations of disease, progressively increase, to this period of natural retirement.

Nature producing but at one season of the year, the means of subsistence, seems to point out a season of activity and a season of repose. We cannot resist the internal evidence of the proposition. Interrupt the latter, and the necessary vigor for the succeeding season of exertion, must be diminished. The muscular system, on which all physical energy depends, is in the matured being, by far the greater part of his constitution; absorbing a much larger share of nutrition, and occupying more of the circulation, than all the body besides: indeed, every other organ seems merely secondary, having no other use than that of contributing to the support of muscular action. Let this overweening circulation be retarded or diminished by inactivity, and it is obvious, that the internal organs of digestion and respiration, &c. will be clogged, injurious congestions ensue, from slight occasional causes, and life become jeopardized. Such fluctuations, in the distribution of our fluids, perform an annual round, constituting between the external, or animal organs, and the internal vegetable existence, a natural and regular *ebb* and

flow; which renders the system liable, and almost spontaneously conduces, to a state of congestive disorder in the fall,—or during that period of transition from muscular predominance to internal regurgitation,—and to disorders of high excitement in the spring,—when we are called by nature to relieve the vital organs, by muscular exertion.—It would seem that in countries not particularly liable to many peculiar causes of disease, the winter and summer are uniformly healthy, while death reigns triumphant in the autumn and spring.

But whether it be attributable to this law, or to the effects of the change of temperature, or some inscrutable cause, the annual changes of the mode of existence, is a fact beyond all controversy.—In this climate, therefore, we meet,—as it were by an active power,—many passive causes of disease; and should, in consequence, banish the erroneous impression, that the excitants of any morbid condition, must be commensurate in power with their visible effects.

Besides the idea of a morbid poison, and the principle just laid down, we have a third great and common error, of equal importance to the former. I allude to the very natural supposition, that the first perceptible events, tending to an attack, are the primary effects of the injurious cause. I have already remarked, that a long insidious train of antecedent changes, preparatory to excitement, may, and without doubt, does often take place, yet not be sufficiently striking to attract attention. To state, then, with certainty, when or where an attack was contracted, is a question, to say the least, often too hastily answered; and the prevalent impression, that an hour or day previous to the manifestation of disease, is in many cases, the time of first exposure to the cause, is assuredly an error, fraught with injurious consequences to the public at large. If I had not already occupied too much of your time, I could adduce a large number of conclusive facts to prove the positions I have laid down, viz: 1st, That there must necessarily exist in all cases of general and severe disorder, a complexity or morbid succession of causes. 2d, That the human system spontaneously tends, towards many particular forms of disease, at certain seasons of the year, in which, of course, the excitants must be of a much milder character than is generally supposed. And 3d, That the mischief produced by deleterious causes, in all probability, is generally effected long before the apparent onset of disorder. The search, therefore, after

one sole-sufficient and powerful poison, capable of producing on a sudden, all the wonderful changes, which so frequently appear at the commencement of the disease, seems to me to promise nothing, but a continued overlooking of the real MALARIA.

Obscure as is the real nature of all morbid causes, we are not to be surprised, that little is really known of the one or many agents included under the name of *miasmata*. Of this only, I feel perfectly convinced, that whether by its own *direct* operation, or by an *indirect* tendency to produce on the skin, or within the absorbing pores, a deleterious secretion, its ultimate operation, as far as regards the disease of this country, is to contract, more or less violently, the superficial capillaries.

I have now, gentlemen, attempted a brief description of the more remarkable varieties of the Western Autumnal Disease. I have also endeavored to illustrate the identity of disorder, in its apparently various forms, by referring them all to innumerable modifications of the simple and congestive ague—modifications attributable to myriads of common, nay trifling causes, which, without perhaps any primary injurious tendency, have yet an influence in suppressing or diminishing some symptoms, and aggravating others.—To attempt an enumeration of these, or a detail of their effects, would be grossly absurd, as the catalogue of particulars may equal in number, the number of created things, and their properties include all that is, or can be known of chemical and mechanical philosophy. The mind must, therefore, be content on this, as on all other subjects, with general principles, culled from the innumerable details, which may be presented to our reasoning powers, during a long period of patient investigation.

Some remarks have been made on the general laws of morbid causation, which, although not particularly calculated to enlarge your knowledge of the actual cause of our epidemic, yet may lead to some important advantages from subsequent research, and establishes at once, a broad rule of practical importance, founded on the unlimited power we possess, to interrupt any complicated succession of corporeal events.

I have likewise attempted an exposition of the real nature and medical philosophy of the circulation, as applicable to the disease under discussion. That the course of reasoning adopted, will carry conviction, in opposition to the various prejudices, which all are taught to adopt, and cherish, as if possessed of inestimable value, I can neither expect to find, or censure if it fail. But this I may reasonably be allowed to hope,—that new vigor in prosecuting and preserving your observations, will be excited, that I may hereafter enjoy the satisfaction, at least of being forced, if I am wrong, to abandon a subject which has already occupied too much of my time and study; but a pleasure much more exalted, if I shall thus be proved to have contributed something, however small, to invigorate the feeble infancy of our noble, but unfortunate science.

J. W. VETHAKE.

Chillicothe, January 21st, 1826.